GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00073522		
Field of study	Civil Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Optional subject group
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Lech Bałachowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=8783

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	2.0	18.0	50

Subject objectives

Knowledge of chosen methods of foundation engineering with focus on hydrotechnic structures and maritime engineering. The application of in-situ soil investigation (dilatometer DMT) and laboratory tests to estimation of geotechnical parameters for hydrotechnic structures design. Knowledge of some design methods for anchor design and off-shore structures foundations. The use of physical modelling to the estimation of pile installation effects in sands.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] prepares and presents the results of calculations, research and analysis in a coherent and logical manner, together with an in-depth interpretation	Student is able to discuss the results of the harbour anchoring project, the interpretation of soil investigation and the results of calculation.	[SU1] Assessment of task fulfilment
[K7_W05] demonstrates knowledge of the principles of evaluation and verification of calculations, tests, measurements and monitoring of advanced structures and civil engineering works	Student is able to interpret the results of some laboratory tests.	[SW1] Assessment of factual knowledge
[K7_W04] analyses in-depth complex problems on the basis of reliable data and appropriately chosen methods, reaching logical conclusions	Student is able to interpret DMT profile and estimate geotechnical parameters.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Pile installation effects based on advanced physical modelling in centrifuge. Compaction piles.Trenchless technology in civil engineering. Horizontal directional drilling HDD in civil and maritime engineering. Anchors in hydrotechnic and offshore structures. Foundations in offshore wind structures. Succsion caissons as anchoring of maritime structures and foundations of wind power. New recommendations concerning technical requirements for hydrotechnic and maritime structures.

Course content – project

Interpretation of the profile from DMT tests and estimation of geotechnical parameters. Design of anchoring in case of sheet pile wall in a harbour using the geotechnical data and soil parameters established on DMT test. Analyse of loadings acting on the sheet pile wall. Choice of size and position of anchor, verification of limit states of all structural elements.

Prerequisites and co-requisites	Knowledge of soil mechanics and foundation engineering. Knowledge on basic laboratory tests and methods of soil investigation and their interpretation.	
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	50.0%	50.0%
Lecture	50.0%	50.0%

Recommended reading	Basic literature	Lech Balachowski, Worku Firomsa Kabeta, Jakub Konkol, Luc Thorel, Matthieu Blanc, et al.. Bearing capac- ity of monotonically installed tapered piles in medium-dense Fontainebleau sand. International Journal of Physical Modelling in Geotechnics, 2026, pp.1 - 17. 10.1680/jphmg. 25.00022. El Naggar MHE and Sakr M (2000) Evaluation of axial performance of tapered piles from centrifuge tests. Canadian Geotechnical Journal 37(6): 1295–1308. El Haffar I, Blanc M and Thorel L. (2017) Impact of pile installation method on the axial capacity in sand. Geotechnique Letters 7(3): 260–265 Yan et al. (2018) Horizontal directional drilling: State-of-the-art review of theory and Applications, *Tunnelling and Underground Space Technology 72 (2018) 162–173,* Wiśniowski, R., Ziaja, J. (2007), PROJEKTOWANIE WIELKOGABARYTOWYCH HORYZONTALNYCH PRZEWIERTÓW STEROWANYCH, WIERTNICTWO NAFTA GAZ TOM 24 ZESZYT 1
	Supplementary literature	Proceedings of offshore geotechnical conferences
	eResources addresses	Basic http://www.marchetti-dmt.pl - Interpretation and use of DMT Supplementary https://project-580geolab.eu/ - Geolab (2021) Geolab – Science for enhancing Europe’s Critical Infrastructure
Example issues/ example questions/ tasks being completed	Description of three indexes from DMT Types of soil anchors Installation of succsion caissons Phases of HDD drillings	
Practical activites within the subject	Not applicable	

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